Successful Integration of Behavioral Technology and Education: Translating Research into Everyday Practice

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Presenters
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- Alicia Burger, M.A., BCBA: Behavior Health Coordinator, The Vista School

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  - Go to www.thevistaschool.org
  - Click on Research & Publications
  - Click on “Successful Integration of Behavioral Technology and Education”

Purpose
Illustrate the application of behavioral technology, including data-based decision making, in a school for children with autism

Overview
- The Vista School: An effective model for combining education and ABA for children with autism
- Trial-based functional analysis methodology: Improving the efficiency of functional behavior assessment in classroom settings
- Improving toilet training outcomes for individuals with autism through school-based training
- Using the standard celeration chart to assist clinical decision making
Learning Objectives

• Identify methods to combine special education and ABA therapy
• List the advantages of combining an instructional educational model with behaviorally-based treatment for children with autism
• Describe methods for measuring program effectiveness

The Vista School

• Founded in 2002, The Vista School is a collaborative effort of dedicated parents, educators, and mental health professionals
  – Exists to bring evidence-based autism education and behavioral care to Central Pennsylvania
  – It is a school designed to meet the educational and therapeutic needs of young children with autism
  – Serves students who need intensive support in a more specialized environment
  – Effectively delivers intensive educational services within a behavior analytic framework

Vista Students by Age

Program Design

• Dually licensed facility
  – Licensed private academic school
  – Licensed partial hospitalization program
• Both programs co-exist within classrooms
  – Small class sizes
  – Structured programs
  – Systematic instruction

Staffing Design

• Multi-disciplinary teams (MDT)
  – Special education teacher
  – Behavior analyst
  – Speech-language pathologist
  – Occupational therapy
  – Training and Coaching coordinator
• High levels of Direct-Care professional support staff
• Individualized Education Plans (IEPs) and Behavior Treatment Plans guide daily interventions

Vista Staff Demographics 2010–2011 School Year
Use of Evidence-Based Practices

• Empirically supported treatments and curricula derived from:
  – Applied Behavior Analysis (ABA)
  – Precision Teaching
  – Direct Instruction
• Imbedded and integrated therapies (SLP, OT)
• Weekly community-based interventions
• Weekly in-home treatment
  – Parent training

Training and Supervision

• Training
  – Single (core) curriculum of staff training
    • ABA based
    • PSI framework
    • Developed via imbedded coaches
• Supervision
  – Combined supervision model across school and behavioral health program/professionals
  – Universally expected practices

Data-Based Decision Making: Individually and Organizationally

• Data collection and progress monitoring systems
• Measurement of micro- and macro-analyses of student outcomes
  – Important to track individual, student progress
    • Daily to monthly progress of IEP and Treatment Plan objectives (MDT staff)
  – Even more important to track group progress at the school level
    • Annual progress monitoring

Annual Progress Monitoring

• Vineland Adaptive Behavior Scales (Vineland – II)
  – Caregiver and Teacher report of adaptive behavior
• Gilliam Autism Rating Scale (GARS)
  – Behavior Analyst report of severity of autism symptoms
• Preschool Language Scale* (PLS)
  – Speech-Language Pathologist report of receptive and expressive language
• Scales of Independent Behavior – Revised (SIB–R)
  – Behavior Analyst report of externalizing, internalizing, and asocial behaviors

Hypotheses

1. Adaptive behavior skills will increase
2. Symptoms associated with ASDs will decrease
3. Communication competencies, specifically auditory and expressive communication, will increase
4. Externalizing, internalizing, and asocial behaviors will decrease

Participants

• Data analyzed across three time points
• 43 students (38 males, 5 females)

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Mean (Standard Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child age (years)</td>
<td>7.75(3.2)</td>
</tr>
<tr>
<td>Child IQ</td>
<td>62.69 (28.09)</td>
</tr>
<tr>
<td>Child ethnicity (non-minority/minority)</td>
<td>91%/9%</td>
</tr>
<tr>
<td>Caregiver age</td>
<td>40.28 (7.95)</td>
</tr>
<tr>
<td>Caregiver relationship status (dual/single)</td>
<td>86%/14%</td>
</tr>
<tr>
<td>Years of caregiver education</td>
<td>14.54(4.12)</td>
</tr>
<tr>
<td>Caregiver employment status (employed/unemployed)</td>
<td>95%/5%</td>
</tr>
<tr>
<td>Annual family income</td>
<td>$35,150 ($8,898)</td>
</tr>
</tbody>
</table>
Adaptive Behavior (Teacher Report) Results

<table>
<thead>
<tr>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Score</td>
<td>Mean Score</td>
<td>Mean Score</td>
</tr>
<tr>
<td>5.5</td>
<td>6.0</td>
<td>6.5</td>
</tr>
<tr>
<td>Play and leisure skills</td>
<td>Socialization skills</td>
<td></td>
</tr>
</tbody>
</table>

Autism Symptoms Results

<table>
<thead>
<tr>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Score</td>
<td>Mean Score</td>
<td>Mean Score</td>
</tr>
<tr>
<td>9.0</td>
<td>8.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Autism Index</td>
<td>Stereotyped behaviors</td>
<td></td>
</tr>
</tbody>
</table>

Communication Competencies Results

<table>
<thead>
<tr>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Score</td>
<td>Mean Score</td>
<td>Mean Score</td>
</tr>
<tr>
<td>44</td>
<td>48</td>
<td>52</td>
</tr>
<tr>
<td>Auditory comprehension</td>
<td>Expressive communication</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

• The Vista School successfully braids education and Medicaid funding, delivering effective and intensive treatment to individuals diagnosed with an ASD

• Necessary components for success include, but may not be limited to:
  – Effective tools for treatment (curricula, data tools)
  – System support (supervision, coaching, parents, administrators)
  – Competency-based staff training
  – Common language and unified approach to treatment

Caregiver report of adaptive skills (expressive and written communication, community skills) were significantly decreasing

– Limitations
   • No comparison group - are children receiving treatment as usual or no treatment faring better or worse?
   • Use of standardized scores (decrease in scores does not indicate a loss of skills)

• Teacher report of adaptive skills (play and leisure, socialization, coping) were significantly increasing

– Are skills that are increasing generalizing differently across situations?

• Autism symptoms decreasing
• Communication competencies were increasing
  – Necessary to use questionnaire with lower basal?
• No changes in maladaptive behaviors were significant
  – Are these behaviors not changing or are the changes not being captured by the SIB – R?
Implications

• Expands existing knowledge of the efficacy of ABA treatments for children/adolescents with moderate to severe ASD symptoms
• Vista illustrates an effective model program that combines education and ABA treatment for autism, and student outcomes support this model as an effective program
• Reiterates importance of both micro- and macro-analyses of student outcomes

Lessons Learned

• Treatment providers, including organizations and schools, should monitor progress
• A focus on the micro level of treatment helps with the macro level implementation of treatment
• Analysis of individual outcomes contributes to the refinement of agency practices and policies
• Continuous measurement and self-assessment produces feedback that leads to continuous quality improvement

References


Evaluating Toilet Training Outcomes for Individuals with Autism Spectrum Disorders

Kirsten Yurich  Alicia Burger
Nora Mendkie  Keina Durica
G. David Smith

Learning Objectives

• Discuss repertoires that may contribute to successful toileting
• Describe the relationship between the three core toileting skills as developed by the Toilet Training Treatment Protocol (TTTP)
• Discriminate between core toileting skills and other associated behaviors often included in toileting programs

Why Toilet Training May Not be Addressed

• Effective training techniques are not well known
• Lack of knowledge/skills
• Perceptions regarding programming
• Perceptions regarding importance
Current Research in Toilet Training

- Offers limited treatment options
  - The most frequently used consist of:
    - Rapid method (Azrin & Foxx, 1971)
    - Response restriction training (Avernick, Melein, & Duker, 2005)
    - Interval training (Chung, 2007)
- Research has not identified the necessary and sufficient treatment components that reliably result in positive toileting outcomes for individuals with autism spectrum disorders (ASD)

Why Further Toileting Research is Needed

- Identify personal skills/individual characteristics which:
  - Are predictive of successful toilet training
  - Indicate “readiness” for toilet training
  - Identify the training conditions/variables that affect the rate and outcome of toilet training
- Identify the differential effects of personal and environmental variables on the acquisition of toileting skills by children, adolescents, and adults with autism

Treatment Approach

Prior to beginning training:

- Observations of student to determine readiness
- Completion of Toilet Training Readiness Assessment and Inventory (TTRAI) with parents and school team

Treatment Approach (Package)

- Prompt fading
  - Accessing the bathroom
  - Request training
  - Manipulating clothing
- Reinforcement
  - Isolated reinforcement for voids in the toilet and dry pants checks
- Over teaching trials
  - For toileting accidents to restore the environment and to build behavioral fluency

Lessons Learned

- Toilet training takes a lot of time
- Relative value of reinforcement for voids
- The importance of accidents
- Prompting
- 3 contingent relationships

Treatment Design – Component Relationships
Treatment Design – Component Relationships

Treatment Integrity

• Target Subject:
  – Average 97.2% treatment integrity with range from 89-100%
• Remainder of subjects:
  – Overall treatment integrity: Average of 97.7% with range from 79-100%
  – Overall Inter-Observer Agreement (IOA): Average of 98.2% with range from 89-100%

Future Directions

• Dry pants checks
• Flooding
• Proximity from bathroom to classroom
• Reinforcement
• Simultaneous training in the home

References

Learning Objectives

• Describe how Trial-Based Functional Analysis (TBFA) differs from other functional analysis methodologies
• List the essential procedural components for conducting a TBFA
• Analyze results from a TBFA to determine the function of a problem behavior

Functional Analysis: An Essential Component of ABA Practice

• Function-based treatment is essential to effective services
• Rarely does treatment include valid functional relationships experimentally determined
• Methodology to facilitate increased use of FA exists and can improve client outcomes

Balancing Precision and Efficiency

Descriptive Analysis

Functional Assessment

Functional Analysis

Traditional Functional Analysis

• Systematic manipulation of antecedent and consequent events to identify contingencies that maintain problem behavior (Iwata, Dorsey, Slifer, Bauman, and Richman, 1982/1994)
• Usually conducted under controlled conditions away from the environment in which the problem behavior occurs
• Potentially reinforces the problem behavior multiple times
• Exposes “examiner” to problem behavior multiple times
• Requires significant commitment of time and resources

Research Provides Options

Functional Analysis

Analogue
• Multiple sessions
• Contrived location

Brief
• One session of each function
• Contrived location
• Treatment Probe

Trial-Based
• Multiple sessions of each function
• In situ location
• Paired Control trial

Trial-Based Functional Analysis – Standard Procedures

• Conducted in the environment in which the problem behavior occurs
• Usually includes attention, escape/avoidance, and access trials
• Trials delivered multiple times each until differentiated results
Trial-Based Functional Analysis - Standard Procedures

- Paired 2-minute conditions: control and test
  - During the “control” segment, the (prospective) reinforcing event is freely and non-contingently available
  - During the “test” segment, the (prospective) reinforcing event is delivered immediately after the subject performs the target response. Otherwise, the reinforcing event is not available

Advantages of TBFA

- Doesn’t require separate location or equipment
- Doesn’t require that student be removed from learning environment (less restrictive than AFA)
- Allows analyses of complex interactions of potentially controlling variables (including MOs)
- Procedures can be easily taught to a variety of caregivers
- Minimizes reinforcement of problem behavior (one response allowed per trial)
- Minimizes examiner exposure to problem behavior

Observations and Resolutions from Vista’s Systematic TBFA Implementation

- Systematic implementation of TBFA procedures across sample of students produced results that indicate possible procedural changes for future TBFAQs within Vista
- TBFA components show sensitivity to procedural modifications
  - “control” condition end criteria (response vs. time)
  - Session presentation order
  - Latency versus occurrence of responding as dependent measure

TBFA Observation #1

- Data show that terminating the control segment when the target response occurs is a contingency that affects rate of responding

Implications

- When the target behavior contingently “ends” the control condition and initiates the test condition, a powerful relationship may exist
  - Punisher
  - Reinforcer
- Future TBFAQs will include non-contingent control trials (target responses will not effect the control condition)

TBFAQ Observation #2

- The order of trial presentation affects the outcome of the TBFAQ
  - Attention trials following task demand
  - Tangible trials following attention, etc.
- Responses of two participants showed substantial differential responding depending on the presentation order of test trials
Differential Responding Resulting from Session Sequences

• Participant One:

<table>
<thead>
<tr>
<th>1st Condition</th>
<th>2nd Condition</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
<td>Tangible</td>
<td>↑</td>
</tr>
<tr>
<td>Alone</td>
<td>Task Demand</td>
<td>↑</td>
</tr>
<tr>
<td>Task Demand</td>
<td>Attention</td>
<td>↑</td>
</tr>
</tbody>
</table>

• Participant Two:

<table>
<thead>
<tr>
<th>1st Condition</th>
<th>2nd Condition</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tangible</td>
<td>Tangible</td>
<td>↑</td>
</tr>
<tr>
<td>Task Demand</td>
<td>Escape Staff</td>
<td></td>
</tr>
<tr>
<td>Task Demand</td>
<td>Task Demand</td>
<td>↑</td>
</tr>
<tr>
<td>Attention</td>
<td>Task Demand</td>
<td>↑</td>
</tr>
</tbody>
</table>

Implications

• Separate the presentation of different (function) trials to test for sequence effects
  – Data show that when blocks of trials are presented at the same time, the order of presentation affects the outcome
  – Future TBFA include blocks of same test (function) or trials in isolation with time between them

TBFA Observation # 3

• Designation and consistent use of the dependent variable – measure
  – Data show differing outcomes for response occurrence and response latency

<table>
<thead>
<tr>
<th>Rank Order</th>
<th>Occurrence/Non-occurrence</th>
<th>Latency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Escape staff touch</td>
<td>Task</td>
</tr>
<tr>
<td>2</td>
<td>Tangible</td>
<td>Tangible</td>
</tr>
<tr>
<td>3</td>
<td>Attention</td>
<td>Attention</td>
</tr>
<tr>
<td>4</td>
<td>Task</td>
<td>Escape staff touch</td>
</tr>
</tbody>
</table>

Conclusion - Implications

• Individual components of TBFA procedures can have a significant impact
• Student results can inform agency practices
• Contextualizing effective practices to individual treatment settings may call for systematic departure from published procedures (data driven – data supported)

References


Learning Objectives

• Identify the limitations of “baseline logic” in clinical application
• Use bounce to assess the effect of behavioral variability before and after clinical intervention
• Use celeration and bounce to evaluate the effect of clinical intervention

Clinical Decision Making – Baseline Logic

• Used to determine “treatment” effect
• Establish “baseline” - record repeated measures of behavior until a stable pattern of responding is obtained
• Introduce a new condition (treatment) - record repeated measures of behavior until a stable pattern of responding is obtained
• Compare the pattern of repeated measures of behavior during “baseline” to repeated measures under treatment conditions

Baseline Logic is Often Neglected in Clinical Practice

• BA’s are often confronted with an “urgent” need to change behavior
• Clinical benefit “overshadows” demonstration of “control”
• Stable pattern is difficult to achieve as the natural environment includes many uncontrolled variables

Behavioral Variability

The frequency and extent to which repeated measures of the same behavior yield different outcomes (Cooper et al, 2007)

Behavioral Variability

• The participant does not respond in a consistent fashion
• Almost universally present - increased levels when the target response is an “undesirable” form of behavior
• Caused by unknown or uncontrolled factor(s) which may or may not be addressed fully by the ABA “treatment”
• Behavioral Variability may itself have clinical significance

Applied behavior analysts often “settle for” changes in level or trend of responding without reference to variability
The Standard Celeration Chart (SCC)

- A tool that can be used to quantify both behavior change (level and trend) and variability
- Rate and direction of behavior change are reflected by changes in celeration
- Behavioral variability is reflected by measures of bounce (around the celeration line)

**Bounce**

- A measure of variability
- Around celeration - up, down, total
- The smaller the measure of total bounce, the lower the variability
- The greater the reduction in the value of total bounce (bounce change) after “treatment,” the greater the treatment effect

**Measuring Total Bounce**

- Bounce around the celeration line - a measure of variability associated with celeration
- Distance from the lower parallel line to the upper parallel line
- Calculated by Excel spreadsheet provided by Behavior Research Company (behaviorresearchcompany.com)

**Phase 1 Baseline**

Celeration = X1.09
Bounce = X4.66
Treatment

Phase 2
Celeration = /1.09
Bounce = X26.20
Bounce Change = X5.62

Refined Treatment

Phase 3
Celeration = /1.12
Bounce = X7.47
Bounce Change = /3.51

Measures of Celeration - Bounce

• Bounce
  - 1st phase X1.09 - X4.66
  - 2nd phase /1.09 - X26.20
  - 3rd phase /1.12 - X7.47

• Bounce Change
  - 1st to 2nd phase X5.62
  - 2nd to 3rd phase /3.51

Interpretation

• Tempting to conclude that treatment (1) was effective
  - The direction of celeration changed from X (increasing) to / (decreasing)
  - The level in phase 2 is lower than the level in phase 1
• Problem – variability increase over five fold (X5.62) from bounce of X4.66 to X26.20 – much greater than chance
• Need to examine intervention and adjust treatment
• Third phase showed result
  - Continued celeration at a slightly higher rate (/1.12)
  - Much reduced variability (/3.51) from X26.20 to X7.47
  - No up bounce
  - Reduced level

When it is impractical or impossible to “control” sources of variability - the Standard Celeration Chart allows behavior analysts to quantitatively assess variability

References
Contextualizing Behavioral Practices

Following the introduction of behavioral technology and before achieving its routine practice, deliberate observation and evaluation is required.

Adjusting and refining such practices within any given organization is necessary in order to obtain optimal effects.

Thank you...

- Lauren Bredickas, M.Ed. – School Psychologist for The Vista School
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- Nora Monskie – Classroom Coordinator with The Vista School
- Jenn Muchmore – Behavior Consultant with The Vista School
- Amanda Pearl, Ph.D. – Post-Doctoral Fellow with The Vista School

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